



Network LTC™ Plus Satellite, Radio-Link™ Kit

Model Numbers 89-9131 and 89-9132

Installation Instructions

Important Notice To Installer

The installation requirements described below are **essential for proper operation** of the Radio-Link control system. If you have any questions regarding the requirements and or radio setup procedures, please contact a Toro distributor for assistance.

- Only the following 2-way radio and power supply models have been tested and approved for use with the Radio-Link system:
 - Motorola® Radius SM50, model number M34DGC20A2AA.
 - Motorola® GM300, 16 channels with programmable 16-pin options connector, model number M04GMC09C3-A.
 - Astron™ Corporation radio power supply, model number SL-15R, 115 V a.c., 60 Hz, 3 Amps (maximum).

Caution: Radios and/or power supplies other than those listed above are subject to damage if installed.

Note: The minimum transmit power for the SM50 radio model is 10W and the GM300 is 1W. Select the radio model best suited to comply with local FCC radio transmission regulations.

Caution: Maximum radio transmit output must not exceed 10W.

- **The following services and procedures must be provided by an authorized Toro representative or Motorola vendor:**
 - An installation site survey to analyze the location for the best radio frequency.
 - Procurement of the radio frequency license.
 - Selection of the required antenna type, size and height based on the distance and terrain between the central and satellite controllers.
 - The antenna cable type, length and installation method required for proper radio operation.
 - Specific antenna requirements (height, power and location) to meet product safety and FCC regulations.
 - Required lightning protection.
 - Procurement of the required radio and power supply.
 - The radio must be configured for Radio-Link operation as follows:
 - Inputs and outputs set with Motorola radio service software similar to the example shown in **Figure 1** for the GM300 radio and **Figure 2** for the SM50 radio.
 - Tx and Rx squelch type **must** be set to **CSQ** (open squelch).
 - Transmit wattage set to 10W or less and compliant with FCC regulations.

Note: The Motorola radio service software screens shown in **Figure 1** and **2** are for example only. Later service software versions may not be formatted as shown, however, the items within boxes must be set as indicated to enable system operation.

Figure 1 – GM300 Radio

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MOTOROLA Radio Service Software          01 Apr 96
GM 300                                  21:23
Version R05.30.00
-----
Model:      M04GMC09C3-A                Coded Squelch
Serial:     428AUC0648                  UHF
Software:   008                         X W
-----
RANGE/VIEW:RADIO WIDE:CONN CON          SCREEN PRINT UTILITY
-----
                ACCESSORY CONNECTOR CONFIGURATION
-----
INTERNAL ACCESSORY:NONE  EXTERNAL ACCESSORY:PUBLIC ADDRESS  CUSTOM:YES
PIN      FUNCTION      DATA      ACTIVE
NUMBER  # DESCRIPTION    DIRECTION DEBOUNCE  LEVEL
-----
4       07 CSQ Detect     OUTPUT     NO        HIGH
6       00 NULL           INPUT      NO        LOW
8       05 PL/DPL & CSQ Det  OUTPUT     NO        HIGH
9       02 Emergency Switch  INPUT      YES       HIGH
12      00 NULL           INPUT      NO        LOW
14      04 PA Switch       INPUT      YES       LOW
-----
POWER-UP DELAY: 0.187 SEC
  
```

Figure 2 – Radius SM50 Radio

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MOTOROLA Radio Service Software          01 Apr 96
Radius SM50  Version R01.00.00          16:00
-----
Model:      M34DGC20A2AA                Coded Squelch
Serial:     PATSNBASIC                  X W  UHF Band
-----
CHANGE/VIEW:RADIO WIDE:ACCESSORY
-----
                ACCESSORY CONFIGURATION
-----
ACC. External.....General I/O          Power-Up Delay.....2.5
ACC. Rx Audio.....Unmuted              ACC. Custom.....Y
-----
PIN      FUNCTION      DIRECTION  DEBOUNCE  ACT LEVEL
-----
4       04 CSQ Detect     OUTPUT     N          HIGH
8       08 PL/DPL & CSQ Det  OUTPUT     N          HIGH
9       09 NULL           INPUT      N          LOW
12      12 NULL           INPUT      N          LOW
14      14 External PTT     INPUT      Y          LOW
  
```

Installation Procedure

Caution: Install only when the satellite controller is used with a 115/120 V a.c. power source. Application of higher voltage will result in severe damage to the radio and/or radio power supply. When operating at peak output, the radio-equipped controller can draw up to 4.7A. The supply wire must comply with the national electrical codes and be properly sized to handle the intended ratings of the system.



WARNING

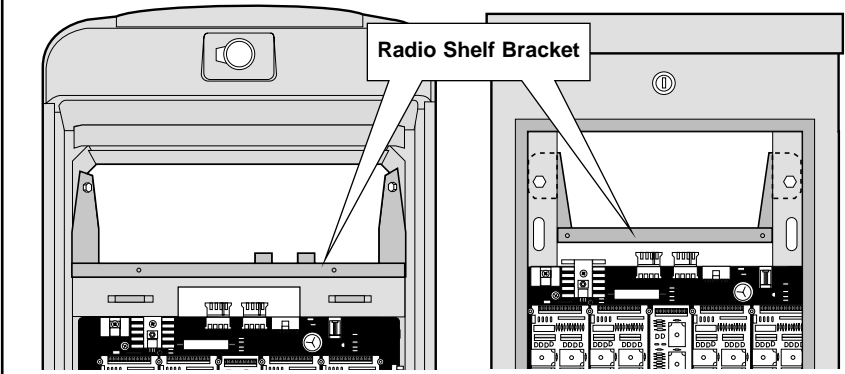
To prevent electrical shock hazard, disconnect power to the controller at source. Do not apply power until installation has been completed. Failure to comply can result in serious or fatal injury and/or equipment damage.

1. Ensure that power to the controller is disconnected at the source. See the **Warning** statement above.
2. Remove the four screws securing the timing mechanism (TM) to the cabinet. Lift the TM up to access the connecting cables. Carefully remove all cables from the TM and place the TM in a protected area.

Note: If the TM has a modem installed, remove the modem secured by four screws and standoffs. This is the Toro Standard Modem and is replaced by the Toro Universal Modem supplied in the Radio-Link kit.

3. Replace the black and white power wire assembly for the TM with the similar cable assembly provided in the kit (see item 17 in **Figure 5**). The new wire assembly is slightly longer enabling it to be routed around the radio shelf bracket.
4. Install the radio shelf bracket into the plastic or metal cabinet entering the cabinet through the back. Secure the shelf with two 1/4-20 x 1/2" machine screws supplied. See **Figure 3**.

Figure 3



5. Prepare the radio (1) and power supply (2) for installation by first placing the radio squarely on top of the power supply as shown in **Figure 4**.

Note: A tie-down strap is provided for the SM50 and the GM300 radio models. Use the stepped-leg strap (3) with the SM50 radio and the straight-leg strap (4) with the GM300 radio.

6. Slide the tie-down strap onto the radio/power supply stack, aligning the elongated holes on the sides of the strap with the threaded mounting holes (5) on the sides of the radio. Attach the tie-down strap using the two wing-nut screws (6) provided with the radio.

Note: Refer to **Figure 5** for the following procedure. The Radio-Link components are installed in the plastic cabinet (shown) and the metal cabinet in the same manner except where noted.

7. Holding the radio/power supply stack together, carefully place them in the center of the support shelf (3), entering the controller cabinet through the back.

Note: When properly positioned, the power supply will fit squarely against the front of the support shelf and two raised tabs on the back of the shelf will fit squarely between the power supply cooling fins. The mounting studs on the support shelf will protrude through the slots provided in the feet of the tie-down strap.

8. Secure the tie-down strap with the fasteners provided. Use the two special 8-32 extension hex nuts (4A) for installation in the metal cabinet, or two 8-32 hex nuts (4B) for the plastic cabinet installation.
9. Secure the filter assembly (5) and Universal Modem assembly (6) to the shelf using the 8-32 x 1/2 screws provided.

Note: The filter assembly housing is attached to the back portion of the support shelf in the metal cabinet application.

10. Attach the AC cable female plug (7) to the power supply receptacle.
11. Attach the radio input power cable plug (8) to the radio receptacle and the cable wires to the corresponding red and black power supply screw-on terminals (9).

Note: Ensure the power cable in-line fuse (10) is properly seated.

12. Attach the radio output cable assembly plug (11) to the radio output receptacle and the modular plug to the phone jack (12) on the Universal modem.

13. Route the antenna cable into the cabinet and connect to the radio mini-UHF antenna jack (13).

Caution: To prevent interference or damage to the controller TM during radio transmission, the antenna must be installed at least 10' (3.5m) away from the TM.

Figure 4

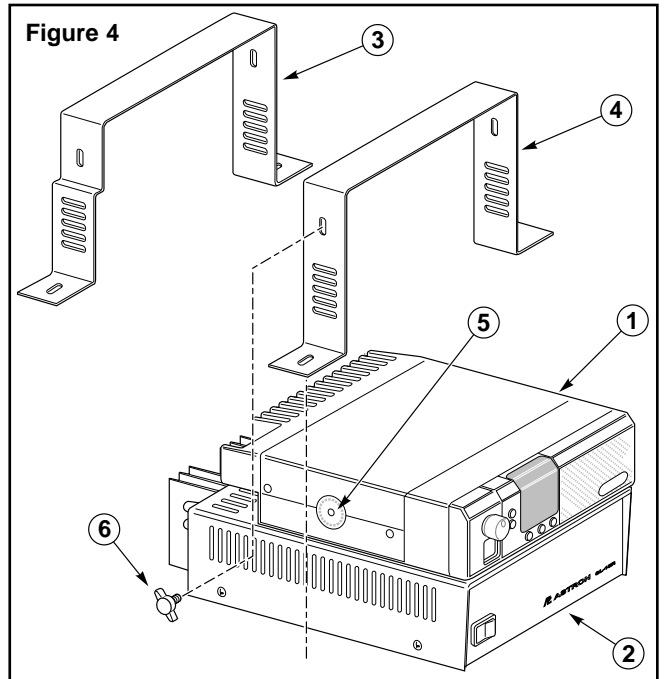
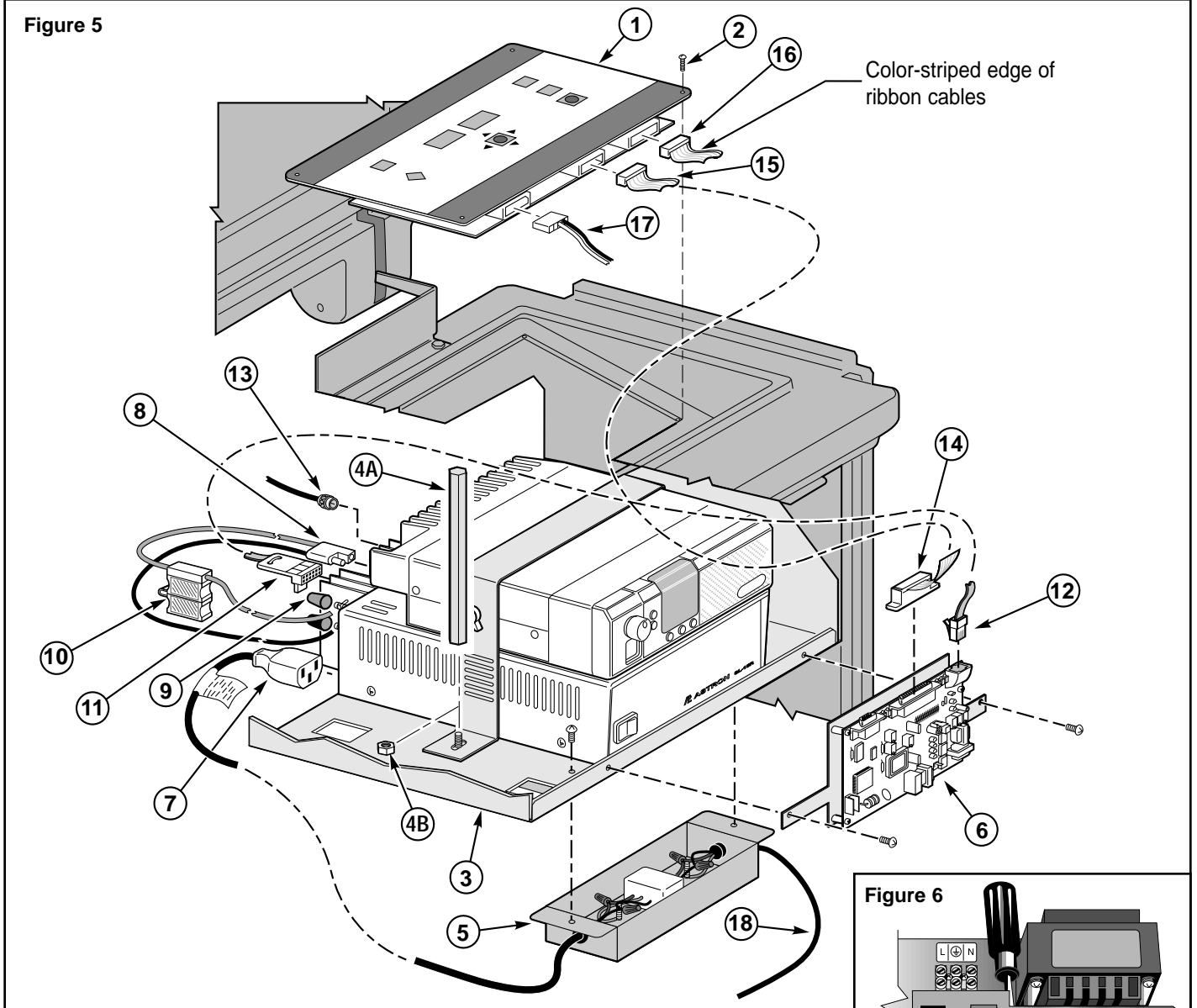


Figure 5



14. Install the modem/TM ribbon cable assembly to the Universal modem serial port (14) and the TM receptacle (15). Install the TM output ribbon cable (16) to the TM receptacle.

Note: The ribbon cables must be installed to the TM with the colored stripe aligned on the right side (when facing the TM).

15. Attach the black and white power wire cable assembly (17) to the TM receptacle.

16. Reposition and secure the TM.

17. Remove the satellite power supply cover.

18. Locate and remove the plastic hole plug in the bottom of the satellite power supply housing using a screwdriver or nut driver as shown in **Figure 6**.

19. Route the power wire cable (18) from the filter assembly into the power supply through the access hole.

20. Secure the cable wires to the white 3-position terminal block as follows: White to Neutral, Black to Line and Green/Yellow to Ground. See **Figure 7**.

21. Install and secure the power supply cover.

22. Apply the Radio-Link information label (supplied in the kit) to the top of the power supply cover adjacent to the model number decal.

23. Verify that all cables are properly routed and connected.

24. Apply power to the satellite at the power source.

Figure 6

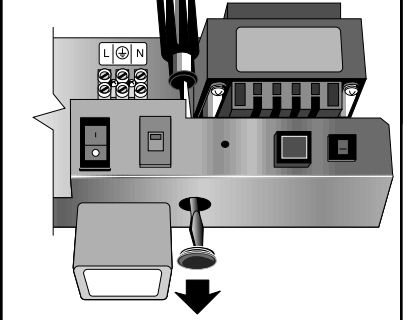
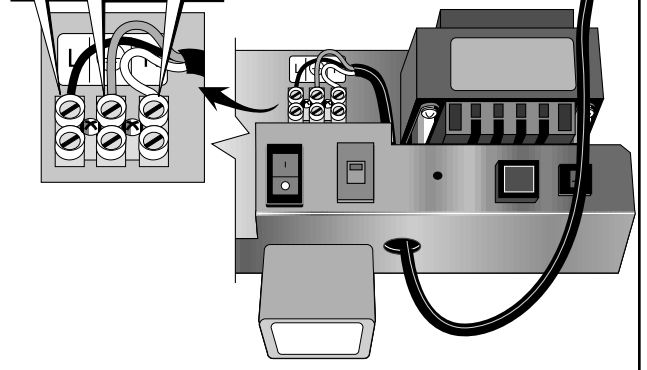


Figure 7

Black - Green - White
Line - Ground - Neutral



Testing System Operation

To test Radio-Link operation, perform the following system checks:

1. Verify that the central and satellite radios are switched on and operating on the same channel.
2. Verify that voice communication exists between the central and satellite radios.
4. Perform the following procedure to initiate a satellite test:

For **Network LTC Central** system:

- Select a radio communication designated satellite Group or Address number.
- Verify that the satellite address (Group/Satellite Number) is correctly set
- Select the Manual control screen and initiate a start command.
- Select Satellite Status to verify satellite operation.

For **SitePro** Central system:

- From the SitePro program menu bar, select Setup>Control System.
- From the Control System page, select the Groups tab. In the Com Mode column, verify **Radio** is selected and click OK.
- Verify that the satellite address is correctly set at the satellite(s).
- Perform a download to the field to configure lead tones for the satellites.
- From the SitePro program menu bar, select the Reports tab, then click the Reports button.
- From the Satellites With Reports page, select the following items: Stand Alone Mode and Central Mode.
- Click on the Start Button. SitePro will pole the satellites and report the results.

For **TouchNet for LTC Plus** Central system:

- Verify that the central programming parameters are properly set for radio communications.
- Select the SAT MONITOR screen. The TouchNet will automatically initiate communications with the field satellites.
- From the Satellite Monitor screen, select the radio-equipped satellite address number, then select the CHECK 1 screen. Satellite Status information will be displayed.

5. If a communication error occurs, refer to the troubleshooting information below.

Troubleshooting The Radio-Link System	
Problem	Solution
The "On-Line" indicator of Central Interface Unit does not illuminate. *	Verify that the central radio has power and is connected properly to the Central Interface Unit.
The "Tx" indicator does not illuminate when the central is sending a signal to the satellite.*	Verify that all cable connections are correct and secure.
The "Tx" indicator illuminates, but the satellite does not respond.*	Verify that the central and satellite radios are operating on the same channel. Verify that all cable connections are correct and secure. Check for proper Group and Address settings.
No radio communications between the central and satellite after all other checks have been made.	Verify that the central and satellite radios are properly configured for this application.
* Does not apply to SitePro central system.	Caution: Radio configuration is to be conducted by an authorized Toro representative or Motorola technician. Refer to radio set-up parameters in Figures 1 and 2.



WARNING: The in-line fuse incorporated in the radio power supply output cable (item 10 in Figure 5) is rated at 15 Amps. If fuse replacement is required, replace only with the same fuse type and rating. Installing a higher amperage fuse can result in serious injury and/or equipment damage due to fire hazard.

Electromagnetic Compatibility

Domestic: This equipment has been tested and found to comply with the limits for a FCC Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. The equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to the radio communications. Operation in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.